Sanford Underground Research Facility

Deep thoughts

weekly tidbits for SDSTA staff from Communications Director Bill Harlan Monday, Feb. 11, 2012

LUX filled with liquid xenon

On Sunday researchers working on the Large Underground Xenon (LUX) experiment finished filling the dark matter detector with liquid xenon.

The process had begun Thursday. Yale University physicist Dan McKenzie, a spokesman for LUX, was underground that morning, but he pointed out that most of the work was being done by young postdocs and even younger graduate students.

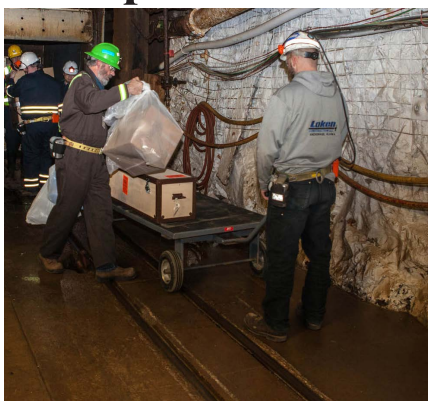
First, they meticulously worked their way through a detailed checklist, verifying that dozens of valves in the experiment's xenon circulation system were closed. Then, at about 9 a.m., they opened valves on eight bottles of compressed xenon, which are stored on the first floor of the Davis Cavern. (Researchers took turns opening the bottles.) That done, the team worked their way through a maze of pipes, opening valves and checking pressures as they went, until the xenon gas reached a final valve on the LUX's top floor. Graduate student Patrick Phelps of Case Western Reserve University turned a small knob to release xenon into the already-cooled detector. Almost immediately, xenon gas began condensing inside the detector. For the next three days, LUX researchers worked 24 hours a day, three shifts a day, as the detector filled.

Case Western physicist Tom Shutt, an early principal investigator for LUX, arrived at the 4850 Level on Friday, but he too insisted his younger colleagues were in charge. "They did all the work," he said. "They've been here forever. They own the system, and only they can run it. They're like Scotty (on "Star Trek"). They're a collection of Scotties."

By Sunday, about a third of a ton of liquid xenon had been added to LUX. Today the team leveled the detector. On Tuesday, they hope to begin circulating xenon, which will flow out of the detector, through a purifying device, then back into the detector. After several weeks of purification, LUX will be ready to boldly go where—in terms of detector sensitivity—no detector has gone before, in search of dark matter.

LUX scientists monitor the flow of xenon gas. Left to right: Yale University physicist Dan McKenzie, University of Maryland graduate student Richard Knoche, Case Western Reserve University graduate student Patrick Phelps and University of Maryland graduate student Attila Dobi.

First purified ^{76}Ge crystals arrived today



Left: Facilities Technician Oren Loken, pulling the cart, helps MAJORANA scientists take germanium crystals off the Yates Shaft cage. Right, A smiling David Radford, holding a cryostat with ^{76}Ge crystals inside, and colleague Brandon White, at left, both of Oak Ridge National Laboratory, delivered their valuable cargo to the 4850 Level this afternoon.

Late this afternoon, the MAJORANA DEMONSTRATOR collaboration took delivery of its first batch of enriched germanium-76 detectors, which will be at the heart of their neutrinoless double-beta decay experiment. David Radford and Brandon White of Oak Ridge National Laboratory drove the germanium from a cave in Tennessee to an underground lab in South Dakota in two days. Except for a detour to avoid a stretch of blizzard-close Interstate 90, the trip was uneventful. Their cargo—worth $1 million, give or take—included five of the 30 germanium detectors that MAJORANA will use.